## MOSQUITO STUDIES (Diptera, Culicidae)

# X. DIXINAE ORIGINALLY DESCRIBED FROM NORTH AMERICA[1]

By

T. Michael Peters[2]

Belkin, Schick and Heinemann (1966) presented all the available data on the source of the type material for all the nominal species of Culicinae and Chaoborinae originally described from North America north of Mexico. In the present paper the treatment of the family Culicidae in the broad sense is completed for North America by similar information for the Dixinae. The data are presented in the same manner. Included in the list are species described by Peters in Peters and Cook (1966), whose taxonomic treatment is followed here.

## LIST OF SPECIES

### Dixinae

The habitats of the immature stages of the Dixinae have been recorded for only 16 species in North America. This information is given below under BIONOMICS for each of these species. For all the other species the following information is presented here as a guide to locating breeding sites. In general the larvae and pupae are found among vegetation or debris along the margins of various bodies of ground water. They are particularly abundant on the margins of very small streams, springs or seepages but occur also in pools in larger, swifter streams as well as in permanent, semipermanent and temporary stagnant pools, ponds, lakes and even in bogs and swamps. Occasionally they may be present in artificial containers.

256. Dixa arge Dyar & Shannon, 1924b:199-200. TYPE: Holotype ♂, Longmire Springs (Mt. Rainier National Park), Washington, 14 June 1917, H. G. Dyar (USNM, 27454). BIONOMICS: [Larvae probably among emergent vegetation in clear, eurythermous, moderately fast, acidic to neutral, shallow streams or small rivers.]

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[2] Department of Entomology, University of Massachusetts, Amherst, Mass. 01002.

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257. Dixa blax Dyar & Shannon, 1924b:199. TYPE: Holotype ♂, Bright Angel (Coconino Co.), Arizona, 10 May 1903, H.S. Barber (USNM, 27453).

258. Dixa brevis Garrett, 1924a:6. TYPE: Holotype ♂, McLean Creek, about 2 mi from mouth, Okanagan Falls, British Columbia, 23 Sept, C. Garrett (CNC). BIONOMICS: Males occur in swarms flying low along the banks about a foot off the water. [Larvae probably in shallow acidic seepage pools or hoofprints.]

259. Dixa distincta Garrett, 1925a:12. TYPE: Holotype ♂ (130), St. Joseph Creek, Cranbrook, British Columbia, 16 Oct, C. Garrett (CNC).

260. Dixa fluvica Peters, 1966:242-243. TYPE: Holotype ♂, Valley Creek (Washington Co.), Minnesota, 3 July 1962, T.M. Peters (USNM, 67268). BIONOMICS: Adults swept from vegetation near stream. Larvae among duckweed and watercress in quiet backwater just below entrance of spring into clear, fast, rocky stream.

261. Dixa fraterna Garrett, 1924a:6. TYPE: Holotype ♂, Bull River, British Columbia, 10 Oct 1923, C. Garrett (CNC).

262. Dixa fusca Loew, 1863a:4. TYPE: Lectotype ♀, New York, probably collected by Osten Sacken (MCZ 10391, by PRESENT SELECTION; MCZ 10391 [2] here designated as paralectotype).

263. Dixa mystica Dyar & Shannon, 1924b:197-198 [=fusca]. TYPE: Lectotype ♂, Cabin John (Montgomery Co.), Maryland, 22 Feb 1915, R.C. Shannon (USNM, 27451, by PRESENT SELECTION; ♂ adult, Difficult Run (Fairfax Co.), Virginia, 3 Oct 1915, W.R. McAtee, USNM, 27451 is here designated paralectotype).

264. Dixa hegemonica Dyar & Shannon, 1924b:194-195. TYPE: Holotype ♂, Eureka (Humboldt Co.), California, 25 May 1903, H.S. Barber (USNM, 27446).

265. Dixa inextricata Dyar & Shannon, 1924b:198-199. TYPE: Lectotype ♂, (slide 2008), Dead Run (Fairfax Co.), Virginia, 25 Mar 1914, R.C. Shannon (USNM, 27452; selection of Peters and Cook, 1966:245).

266. Dixa johannseni Garrett, 1924a:7. TYPE: Holotype ♂, Michel, British Columbia, 21 Sept, C. Garrett (CNC). BIONOMICS: [Adults probably swarm above streams.]

267. Dixa lobata Garrett, 1924a:6. TYPE: Holotype ♂, Cranbrook, British Columbia, 30 June, C. Garrett (CNC).

268. Dixa melanderi Peters, 1966:246. TYPE: Holotype ♂, Puget, Washington, 4 July 1924, A. L. Melander (USNM, 67269).

269. Dixa modesta Johannsen, 1903b:429-431. TYPE: Lectotype ♂, Ithaca (Tompkins Co.), New York, Apr 1902, O.A. Johannsen (Cornell 2992, by PRESENT SELECTION). BIONOMICS: Larvae in slow flowing streams.

270. Dixa neohegemonica Peters, 1966:247. TYPE: Holotype ♂, Mill Valley (Marin Co.), California, 6 May 1936 (CAS).

271. Dixa notata Loew, 1863a:4. TYPE: Lectotype ♀, Maryland, probably collected by Osten Sacken (MCZ 10393, by PRESENT SELECTION; MCZ 10393 [2] is here designated paralectotype).

272. Dixa pullogruma Peters, 1966:248-249. TYPE: Holotype ♂, Rapid Creek, 2 mi E of Rochford (Pennington Co.), South Dakota, 14 Sept 1961, T.M. Peters et al. (USNM, 67270). BIONOMICS: Larvae in a fast, cold stream.

273. Dixa repanda Peters, 1966:249. TYPE: Holotype ♂, Goodhue Co., Minnesota, 21 May 1937, D.G. Denning (USNM, 67271).

274. Dixa rhathyme Dyar & Shannon, 1924b:197. TYPE: Holotype ♂, Glacier (Whatcom Co.), Washington, 4 June 1917, H. B. Dyar (USNM, 27450).

275. Dixa montana Garrett, 1924a:5; garretti Cooper & Rapp, 1944:247, new name [=rhathyme]. TYPE: Holotype ♂, Cranbrook, British Columbia, 30 June, C. Garrett (CNC).

276. Dixa parva Garrett, 1924a:6. [=rhathyme]. TYPE: Holotype ♂, Wasa, British Columbia, Oct, C. Garrett (CNC).

277. Dixa rudis Garrett, 1924a:6. TYPE: Holotype ♂, Ta Ta Creek, Wasa, British Columbia, 27 Sept, C. Garrett (CNC).

278. Dixa similis Johannsen, 1923a:57-58. TYPE: Holotype ♂, Ithaca (Tompkins Co.), New York, Aug, O.H. Johannsen (Cornell 2993).

279. Dixa terna Loew, 1863a:3. TYPE: Lectotype ♂, New York, probably collected by Osten Sacken (MCZ 10394, by PRESENT SELECTION; MCZ 10394 [2] is here designated as paralectotype).

280. Dixa venosa Loew, 1872a:50. TYPE: Holotype ♀, Belfrage, Texas (MCZ 10395).

281. Dixa xavia Dyar & Shannon, 1924b:195-196. TYPE: Holotype ♂, Los Gatos (Santa Clara Co.), California, 16 Feb 1906, J.M. Aldrich (USNM, 27448).

282. Dixella aliciae (Johannsen, 1924b:45-46). TYPE: Holotype ♂, Claremont, across street E from High School (Los Angeles Co.), California, 1 May 1923, Alica M. Westfall (Cornell 2995). BIONOMICS: Reared from larvae collected from surface of pool formed by leak in irrigation pipe.

283. Dixella aurora Peters, 1966:254-255. TYPE: Holotype ♂, swamp, Ringwood Reservoir (Tompkins Co.), New York, 16-17 June 1963, W.W. Wirth (USNM, 67272).

284. Dixella californica (Johannsen, 1923a:54-55). TYPE: Holotype ♂, Stanford University (Santa Clara Co.), California, Mar (Cornell 2770). BIONOMICS: [Larvae probably in clear, shallow, eurythermous, acidic pools with muddy bottoms and emergent vegetation.]

285. Dixella thones (Dyar & Shannon, 1924b:193-194) [=californica]. TYPE: Lectotype ♂, Longmire Springs [Mt. Rainier Nat. Park], Washington, 2 Aug 1905, J.M. Aldrich (USNM, 27445, slide 2028, by PRESENT SELECTION; USNM, 27445, 14 June 1917, H.G. Dyar, is here designated paralectotype).

286. Dixella clavata (Loew, 1869b:2). TYPE: Lectotype ♀, Lenox (Berkshire Co.), Massachusetts, Osten Sacken (MCZ 10390, by PRESENT SELECTION; MCZ 10390 [2] is here designated a paralectotype.)

287. Dixella cornuta (Johannsen, 1923a:55-56). TYPE: Holotype ♂, McLean (Tompkins Co.), New York, Oct (Cornell 2990). BIONOMICS: [Larvae probably in permanent open or temporary woodland ponds, acidic to neutral, less than 6 feet deep, 11-28°C, with muddy or leafy bottom. May also occur in slow to fast, shallow, slightly acidic, 14-22°C stream.]

288. Dixella plexipus (Garrett, 1925b:5) [=cornuta]. TYPE: Holotype ♂ (150), Nelson, British Columbia, June, C. Garrett (CNC).

289. Dixella simplex (Garrett, 1925a:12) [=cornuta]. TYPE: Lectotype ♂, Cranbrook, British Columbia, June, C. Garrett (CNC; by PRESENT SELECTION).

290. Dixella somnolenta (Dyar & Shannon, 1924b:195) [=cornuta]. TYPE: Holotype ♂, Viola (Latah Co.), Utah, 21 Aug 1912, J.M. Aldrich (USNM, 27447).

291. Dixella spiralis (Garrett, 1924a:1-2) [=cornuta]. TYPE: Lectotype ♂, Wasa, British Columbia, 22 Oct 1923, C. Garrett (CNC 5332, by PRESENT SELECTION; ♂, Wasa, British Columbia, 25 Oct 1923 (CNC 5341); ♂, Wasa, British Columbia, 21 Oct 1923; ♂, Wasa, British Columbia, 23 Oct 1923;

♂, Cranbrook, British Columbia, 2 July 1920 (CNC 2618); ♂, Cranbrook, British Columbia, 21 Oct 1923 (CNC 5511) are here designated paralectotypes).

292. Dixella deltoura Peters, 1966:257-258. TYPE: Holotype ♂, Nenana, Alaska, 13 June 1951, R.I. Sailor (USNM, 67274).

293. Dixella dorsalis (Garrett, 1924a:4). TYPE: Holotype ♂, Wasa, British Columbia, 23 Oct, C. Garrett (CNC). BIONOMICS: [Larvae probably in shallow bogs, seepage pools, temporary woodland pools, or permanent open ponds with a temperature range of 13-23°C, muddy or leafy bottoms, and 5.0-6.2 pH. Larvae probably situated at bases of sphagnum or sedge hummocks. Larvae may also occur in large, slow streams less than 4 ft. deep, with a pH range of 6.2-7.0, clear, and with a muddy or sandy rock bottom.]

294. Dixella dyari (Garrett, 1924a:3). TYPE: Holotype ♂, Cranbrook, British Columbia, 25 June, C. Garrett (CNC).

295. Dixella indiana (Dyar, 1925:217-218). TYPE: Holotype ♂, Fort Benjamin Harrison (Marion Co.), Indiana, 23 June 1925, H. K. B. Hufford (USNM, 28419). BIONOMICS: [Larvae probably in clear to slightly turbid seepage pools in slow to moderately fast, clear to rust-colored streams with a range of temperature of 15.5-23.5°C, pH 5.5-8.0, depth of 10 inches-5 feet, muddy to rocky bottom. Adults probably swarm at edges of stream at twilight.]

*296. Dixella marginata (Loew, 1863a:2). TYPE: Holotype ♀, District of Columbia, Osten Sacken (MCZ 10392).

297. Dixella neoaliciae (Garrett, 1924a:2-3). TYPE: Holotype ♂, Bozeman (Gallatin Co.), Montana, 3 Sept, C. Garrett (CNC). BIONOMICS: [Larvae probably in eddies of cold, clear, slightly acidic streams or in warm, clear, slightly acidic ponds less than 3 feet deep and with silted bottom. Adults probably rest in emergent vegetation during the day.]

298. Dixella nova (Walker, 1848:85). TYPE: ♂, New York Factory, [Hudson's Bay at mouth of Hayes River, Manitoba] (BM). BIONOMICS: [Larvae probably in shallow, rust-colored bogs and clear temporary woodland pools or seepage pools with leafy bottoms, a temperature range of 13-17.5°C and pH of 6.0-6.8.]

299. Dixella centralis (Loew, 1863a:3) [=nova]. TYPE: Holotype ♂, New York, Osten Sacken (MCZ 10389). Terminalia of the type is missing.

300. Dixella nocheles (Dyar & Shannon, 1924b:196-197) [=nova]. TYPE: Holotype ♂, Biscayne Bay (Dade Co.), Florida, probably A. T. Slossen (USNM, 27449).

301. Dixella occidentalis (Garrett, 1924a:4-5) [=nova]. TYPE: Holotype ♂, Gold Creek, Cranbrook, British Columbia, 1 May, C. Garrett (CNC).

302. Dixella serrata (Garrett, 1924a:2). TYPE: Holotype ♂, Oliver, British Columbia, 6 May, C. Garrett (CNC). BIONOMICS: [Larvae probably in shallow ponds or very slow-moving streams with silt bottoms, a temperature range of 14.5-28°C and pH of 6.8-7.0. Infrequently larvae may be found in clear, fast, warm, rocky, very acidic streams.]

303. Dixella techana Peters, 1966:263. TYPE: Holotype ♂, Hassayampa River, Wickenburg (Maricopa Co.), Arizona, 29 June 1953, W. W. Wirth (USNM, 67275). BIONOMICS: [Larvae probably in clear, warm, alkaline, shallow stream with current less than 50 ft/min. and a rocky bottom.]

304. Dixella universitatis (Cockerell, 1926:166). TYPE: Holotype ♀, Boulder (Boulder Co.), Colorado, 27 Sept 1926, Scott Gale (USNM, 29540).

305. Dixella vespertina Peters, 1966:264. TYPE: Holotype ♂, McFadden Pond, Corvallis (Benton Co.), Oregon, 17 Sept 1953, V. Roth (Oregon State Univ.).

*306. Meringodixa chalonensis Nowell, 1951:299. TYPE: Lectotype ♂, Chalone Creek [Pinnacles Nat. Monument], California, 20 Apr 1950, W. R. Nowell (USNM, by PRESENT SELECTION). BIONOMICS: Larvae in protected, shaded spots among rocks in stream.

## Nomen Dubium

307. Dixa recens Walker, 1848:85. TYPE: ♀, New York Factory [Hudson's Bay at mouth of Hayes River, Manitoba]; type lost and the description is inadequate for determination of the taxonomic species involved (Peters and Cook, 1966:251).

## LIST OF LOCALITIES

### Canada

BRITISH COLUMBIA

Bull River: 261. Dixa fraterna.

Cranbrook: 259. Dixa distincta; 267. Dixa lobata; 294. Dixella dyari; 275. Dixella garretti; 301. Dixella occidentalis; 289. Dixella simplex; 291. Dixella spiralis.

Michel: 266. Dixa johannseni.

Nelson: 288. Dixella plexipus.

Okanagan Falls: 258. Dixa brevis.

Oliver: 302. Dixella serrata.

Wasa: 276. Dixa parva; 277. Dixa rudis (Ta Ta Creek); 293. Dixella dorsalis.

MANITOBA

New York Factory (Hudson's Bay at mouth of Hayes River): 298. Dixella nova; 307. Dixa recens.

### United States

ALASKA

Nenana: 292. Dixella deltoura.

ARIZONA

Bright Angel (Coconino Co.): 257. Dixa blax.

Wickenburg, Hassayampa River (Maricopa Co.): 303. Dixella techana.

CALIFORNIA

Chalone Creek (San Benito Co.): 306. Meringodixa chalonensis.

Claremont (Los Angeles Co.): 282. Dixella aliciae.

Eureka (Humboldt Co.): 264. Dixa hegemonica.

Los Gatos (Santa Clara Co.): 281. Dixa xavia.

Mill Valley (Marin Co.): 270. Dixa neohegemonica.

Stanford University (Santa Clara Co.): 284. Dixella californica.

COLORADO
Boulder (Boulder Co.): 304. Dixella universitatis.

DISTRICT OF COLUMBIA
Washington: 296. Dixella marginata.

FLORIDA
Biscayne Bay (Dade Co.): 300. Dixella nocheles.

IDAHO
Viola (Latah Co.): 290. Dixella somnolenta.

INDIANA
Fort Benjamin Harrison (Marion Co.): 295. Dixella indiana.

MARYLAND
Cabin John (Montgomery Co.): 263. Dixa mystica.
Locality not specified: 271. Dixa notata.

MASSACHUSETTS
Lenox (Berkshire Co.): 286. Dixella clavata.

MINNESOTA
Valley Creek (Washington Co.): 260. Dixa fluvica.
Goodhue Co.: 273. Dixa repanda.

MONTANA
Bozeman (Gallatin Co.): 297. Dixella neoaliciae.

NEW YORK
Ithaca (Tompkins Co.): 269. Dixa modesta; 278. Dixa similis.
McLean (Tompkins Co.): 287. Dixella cornuta.
Ringwood Reservoir (Tompkins Co.): 283. Dixella aurora.
Locality not specified: 262. Dixa fusca; 279. Dixa terna; 299. Dixella centralis.

OREGON
Corvallis, McFadden Pond (Benton Co.): 305. Dixella vespertina.

SOUTH DAKOTA
Rapid Creek (Pennington Co.): 272. Dixa pullogruma.

TEXAS
Belfrage: 280. Dixa venosa.

VIRGINIA
Dead Run (Fairfax Co.): 265. Dixa inextricata.

WASHINGTON
Glacier (Whatcom Co.): 274. Dixa rhathyme.
Mt. Rainier National Park, Longmire Springs: 256. Dixa arge; 285. Dixella thones.
Puget: 268. Dixa melanderi.

## REFERENCES CITED

The citations of author, date and page in the List of Species refer to the bibliography in "A Catalog of the Diptera of America North of Mexico" (U. S. D. A. Agricultural Handbook No. 276, 1965).

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## INDEX TO SPECIFIC NAMES

The references are to the numbers preceding the species names in the List of Species.

aliciae, 282
arge, 256
aurora, 283
blax, 257
brevis, 258
californica, 284
centralis, 299
chalonensis, 306
clavata, 286
cornuta, 287
deltoura, 292
distincta, 259
dorsalis, 293
dyari, 294
fluvica, 260
fraterna, 261
fusca, 262
garretti, 275
hegemonica, 264
indiana, 295
inextricata, 265
johannseni, 266
lobata, 267
marginata, 296
melanderi, 268
modesta, 269
montana, 275
mystica, 263
neoaliciae, 297
neohegemonica, 270
nocheles, 300
notata, 271
nova, 298
occidentalis, 301
parva, 276
plexipus, 288
pullogruma, 272
repanda, 273
recens, 307
rhathyme, 274
rudis, 277
serrata, 302
similis, 278
simplex, 289
somnolenta, 290
spiralis, 291
techana, 303
terna, 279
thones, 285
universitatis, 304
venosa, 280
vespertina, 305
xavia, 281